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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/769,082	01/24/2001	George Stephen Mecherle	258/237	6427

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EXAMINER	
SINGH, DALZID E	

ART UNIT	PAPER NUMBER
2633	

DATE MAILED: 12/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/769,082	MECHERLE ET AL.	
	Examiner	Art Unit	
	Dalzid Singh	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *107-122* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *107-122* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 107-122 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sanchez (US Patent No. 6,446,867) in view of Suzuki (US Patent No. 3,939,435).

Regarding claim 107, Sanchez teaches an interface system with laser driver comprising:

providing a wideband input signal (see col. 8, lines 64-67, signals such as HF, VHF, UHF, EHF, microwave, etc., used in the communication system of Sanchez can be considered as wideband signal);

providing a power amplifier to drive a laser diode (see col. 8, lines 36-44 and lines 57-64, Sanchez teaches power amplifier to drive the laser);

generating a wideband output current from the wideband input signal to modulate the laser diode (since the input signal is considered as wideband, therefore the output signal transmitted to the laser will be an amplified wideband current signal); and,

operating the power amplifier as a voltage-controlled current driver for the laser diode (see col. 9, lines 1-3, Sanchez discloses that the amplifier forms as a voltage-controlled current source to drive the laser).

Sanchez discloses power amplifier coupled to the laser diode as discussed above and differs from the claimed invention in that Sanchez does not specifically disclose that the power amplifier has low output impedance. However, it is well known for power amplifiers to have low output impedance. Such well known concept is cited by Suzuki. In col. 3, lines 13-18, Suzuki discloses power amplifier, which has low output impedance. Therefore, based on the teaching of Suzuki , if is not inherent, it would have been obvious that the power amplifier of Sanchez has a low output impedance in order to drive the laser. The motivation of providing power amplifier with low output impedance is so that maximum amount of power or current can be transferred to the laser diode.

Regarding claim 108, Sanchez teaches an interface system with laser driver comprising:

providing a wideband input signal (see col. 8, lines 64-67, signals such as HF, VHF, UHF, EHF, microwave, etc., used in the communication system of Sanchez can be considered as wideband signal);

providing a power amplifier to drive a laser diode (see col. 8, lines 36-44 and lines 57-64, Sanchez teaches power amplifier to drive the laser);

generating a wideband output current from the wideband input signal to modulate the laser diode (since the input signal is considered as wideband, therefore the output signal transmitted to the laser will be an amplified wideband current signal); and,

operating the power amplifier as a voltage-controlled current driver for the laser diode (see col. 9, lines 1-3, Sanchez discloses that the amplifier forms as a voltage-controlled current source to drive the laser);

selecting minimum, maximum, and average power levels for the laser diode (in col. 8, lines 57-60 and col. 9, lines 22-24, Sanchez discloses a control line coupled to the drive controller which control the power amplifier and thus the laser diode; since there exist a control line to control the controller, therefore it would have been obvious that a certain power level (such as minimum, maximum and average power level) can be selected for the laser diode);

supplying bias current to the laser diode to operate the laser at the selected average power level (as discussed above, once the desired power level is selected the current to the laser diode is adjusted accordingly); and

supplying a wideband modulation to cause the laser output to vary between selected minimum and maximum output power levels (as discussed above, Sanchez discloses wideband input signal).

Sanchez discloses power amplifier coupled to the laser diode as discussed above and differs from the claimed invention in that Sanchez does not specifically disclose that the power amplifier has low output impedance. However, it is well known for power amplifiers to have low output impedance. Such well known concept is cited by Suzuki. In col. 3, lines 13-18, Suzuki discloses power amplifier, which has low output impedance. Therefore, based on the teaching of Suzuki , if is not inherent, it would have been that the power amplifier of Sanchez has a low output impedance in order to

drive the laser. The motivation of providing power amplifier with low output impedance is so that maximum amount of power or current is transferred from to the laser diode.

Regarding claim 109, the combination of Sanchez and Suzuki differs from this claim in that the combination does not specifically teach teaches that the input signal is characterized by a rate of at least 10 Mbits/second and that the power amplifier provides output current of at least 100 mA to the laser diode. However, as shown in Fig. 2A, the control unit (230) is used to control current going to power amplifier (242). Since the input signal current going to driver is controllable, therefore it would have been obvious to a person of ordinary skill at the time the invention was made to adjust the current to the laser to be at least 100mA. Moreover, as discussed in col. 8, lines 64-67, Sanchez discloses that the input signal can be in LF, MF, HF, VHF, UHF, EHF, microwave, etc.; this provides that the rate can be at least 10Mbits/sec).

Regarding claim 110, as described in claim 107, the combination of Sanchez and Suzuki discloses that the power amplifier is operated as a voltage-controlled current source, and differs from this claim in that the combination does not specifically disclose DC biasing the power amplifier with a gate voltage to provide linear modulation of the laser drive current. Since the combination of Sanchez and Suzuki discloses that the power amplifier is operated as a voltage controlled current source, it would have been obvious that the terminal of the transistor is biased so that the amplifier is operated in linear mode and provide linear modulation of the laser drive current.

Regarding claim 111, the combination of Sanchez and Suzuki differs from the claimed invention in that the combination does not specifically disclose that the

modulation of the power amplifier output causes the laser drive current to swing from nearly off to the desired output power with an optical power extinction ratio of at least 10:1. However, in col. 8, lines 60-64, Sanchez discloses that the driver may be digital. Since digital driver operate in binary form, the signal swings from 0 to 1 at a certain voltage level. Therefore, it would have been obvious to set a certain voltage level (gain) of the signal in such a way that the swing optical power extinction ratio is at least 10:1).

Regarding claim 112, since the current level can be controlled by controller (230), therefore the output power of the laser driver is adaptive (see claim 109).

Regarding claims 113, as shown in Fig. 2A, Sanchez teaches that the laser output is controlled by the controller (230); since the output is controllable, it would have been obvious to control the laser in multiple discrete steps.

Regarding claim 114, as discussed above in claim 110, the combination of Sanchez and Suzuki discloses that the controller (230) controlled the power amplifier and differ from the claimed invention in that the combination does not disclose that the input signal controlling the laser output power is accomplished by simultaneously controlling the power amplifier gate bias voltage, bias current of the laser diode, and modulation current of the laser diode using an input signal. However, since the power amplifier provides current to laser and the power amplifier is controllable, therefore, it would have been obvious to a person of ordinary skill in the art that in order to operate the laser in a linear range voltage and current bias (such as the gate bias voltage, bias current of the laser diode, and modulation current of the laser diode using an input

signal) across terminals of the transistor has to maintained at a specific operating parameter.

Regarding claims 115, as discussed in claim 110, the combination of Sanchez and Suzuki teaches that the laser output is controlled by a controller and differs from this claim in that the combination does not specifically teach that the digital input signal is characterized by at least 2 bits. However, it would have been obvious that the control signal provided by the controller is at least 2 bits.

Regarding claim 116, in col. 13, lines 12-17, Sanchez discloses attenuation of the signal (it would have been obvious that there exist an attenuator to attenuate the signal).

Regarding claim 117, Sanchez discloses imposing a narrowband modulation on the laser drive current (in col. 8, lines 64-67, Sanchez discloses input signal such as LF, MF, HF, VHF, UHF, EHF, microwave, etc., therefore it would have been obvious to select a narrowband signal for modulation on the laser drive current).

Regarding claims 118 and 119, the combination of Sanchez and Suzuki differs from the claimed invention in that the combination does not specifically disclose the narrowband is a telemetry signal or a tracking tone. However, it would have been obvious to classify the narrowband signal as telemetry signal or a tracking tone.

Regarding claim 120, in view of claim 117, Sanchez discloses that the narrowband is between 50Hz and 50kHz, which is the low frequency (LF) band (see col. 8, lines 64-67).

Regarding claims 121 and 122, Sanchez teaches monitoring laser modulation current (in col. 10, lines 49-64, Sanchez discloses monitoring performance of the laser signal; in doing such it would have been obvious that parameters such as current and voltage levels of the signal is measured).

Response to Arguments

3. Applicant's arguments with respect to claims 107-122 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wolkstein et al (US Patent No. 4,243,951) is cited to show driver circuit comprising of FET coupled to a low impedance laser (see Fig. 1, and col. 3, lines 24-27).

Tanase et al (US Patent No. 6,590,914) is cited to show semiconductor laser drive circuit in which the driver circuit comprises of low output impedance (see Fig. 1).

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalzid Singh whose telephone number is (571) 272-3029. The examiner can normally be reached on Mon-Fri 9am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272--3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DS
December 22, 2004

M. R. Sedighian

M. R. SEDIGHIAN
PRIMARY EXAMINER